

Cool Season Crops for Vegetable Gardens



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Toshiyuki
IMAI

PDF Part 1

Matt Jones

Horticulture Extension Agent

NC Cooperative Extension - Chatham County Center

Tonight's Webinar

- Brief review of planting calendars
- A tour of cool season vegetables
 - Origin
 - Planting methods
 - Care and cultivation
 - Best cultivars
- Previous classes: Soils, pests & diseases, warm season crops.



Additional Resources

<https://go.ncsu.edu/chathamveggies>

Planting Seasons

Cool season

- Plant **July-Sept** for fall crop
- **Feb - April** for spring crop

Warm season

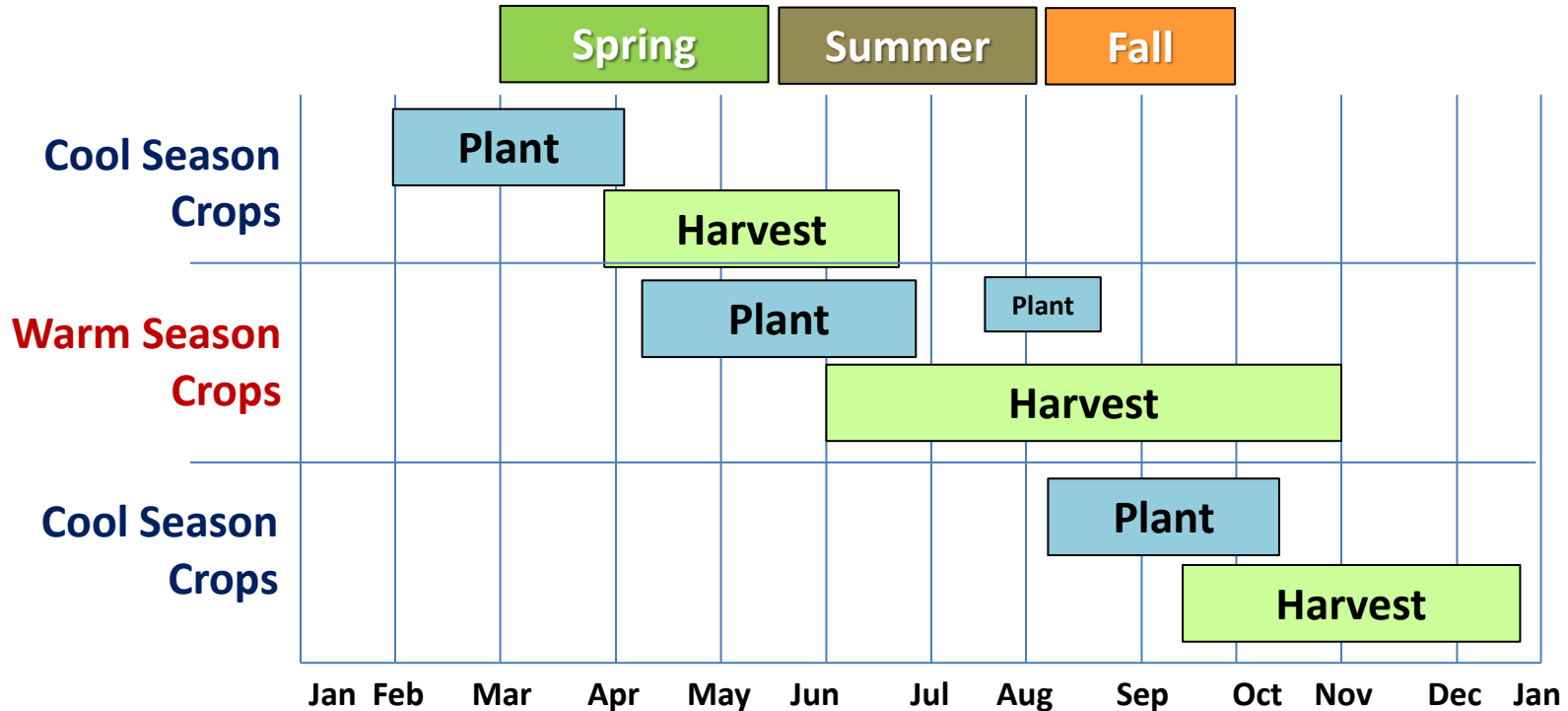
- Plant after average last spring frost date, April 15
- See “Central NC Planting Calendar” for specific dates



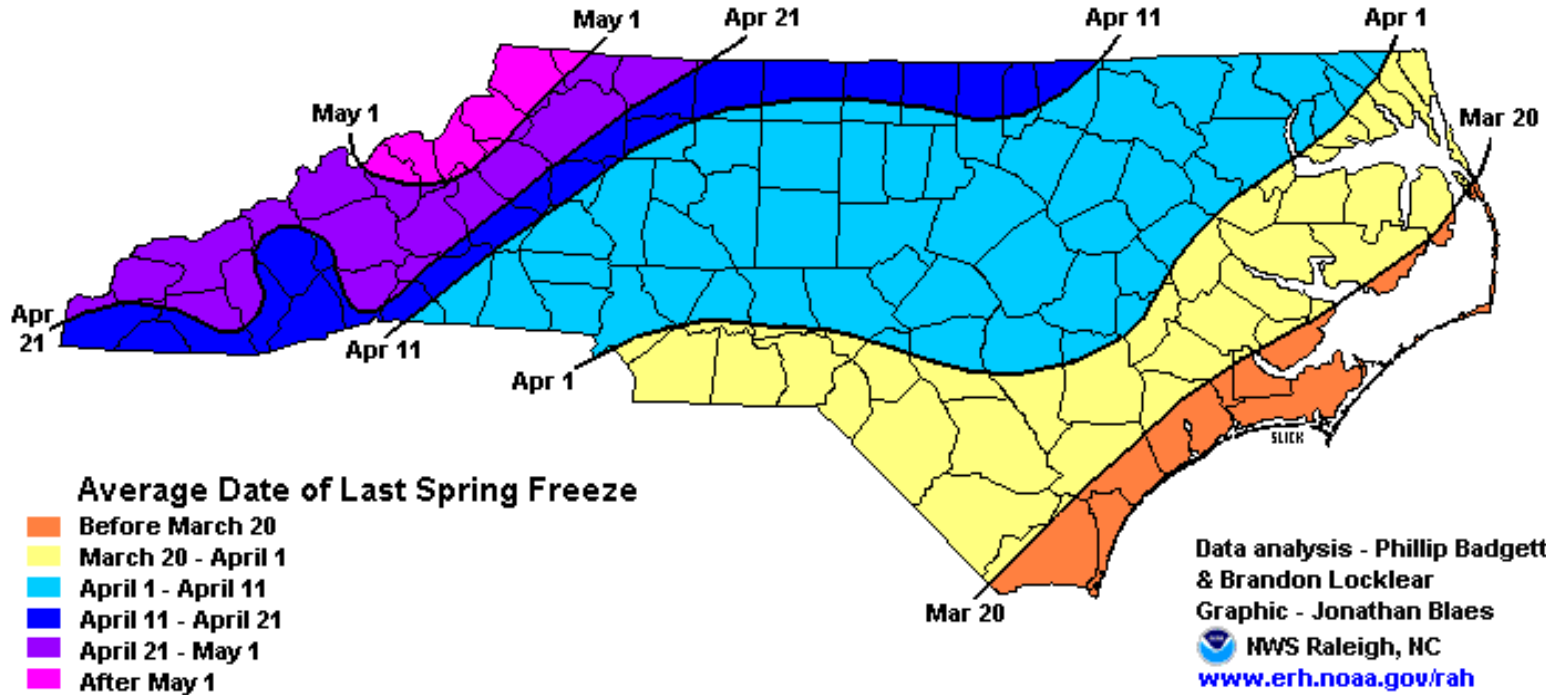
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Not the same as the produce aisle!

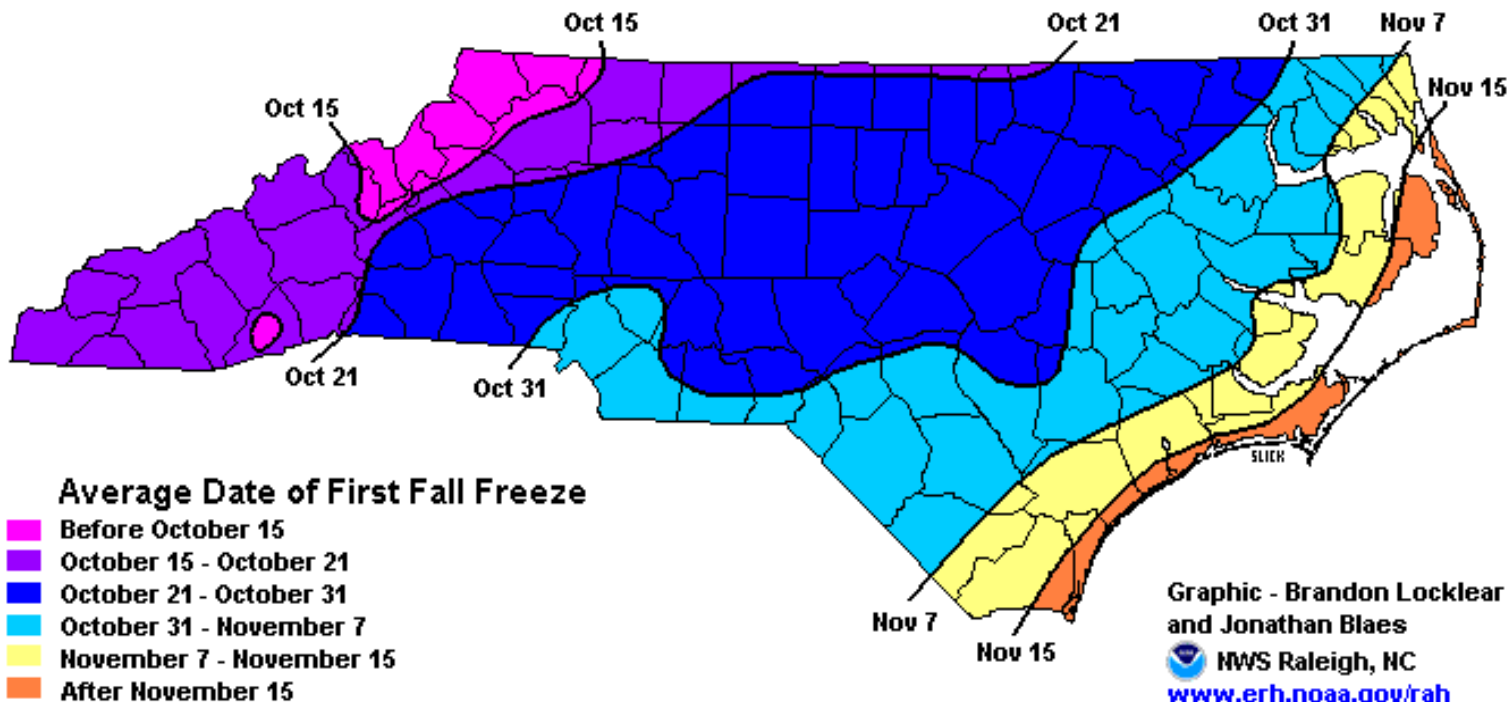
Planting Seasons



Average Last Frost Date



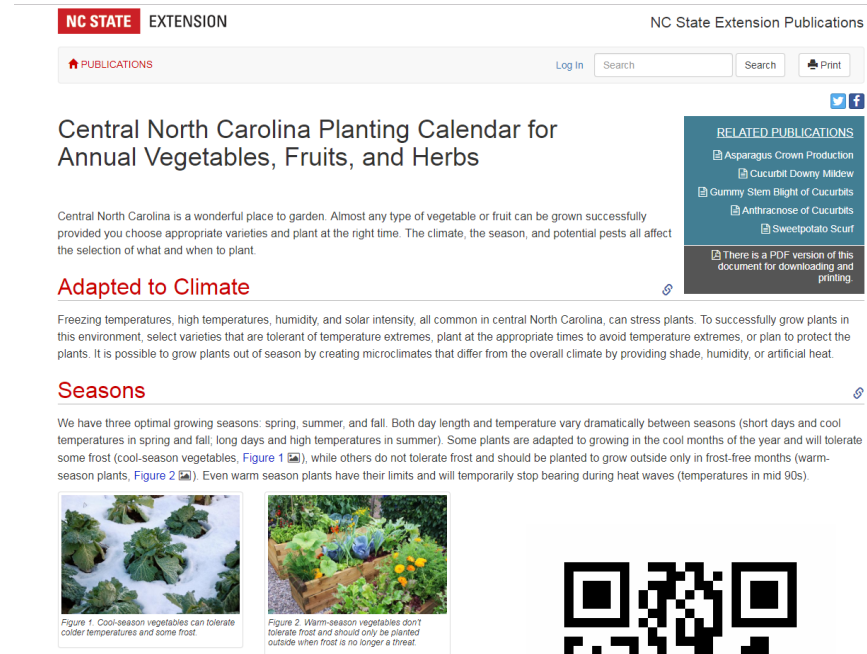
Average First Frost Date



Planting Calendars

- Use Extension planting calendars
- Do not rely on seed packets for regionally-accurate information!
- Refer to direct planting, not seed starting

<https://go.ncsu.edu/veggiecalendar>



The screenshot shows the NC State Extension website page titled "Central North Carolina Planting Calendar for Annual Vegetables, Fruits, and Herbs". The page includes a navigation bar with "NC STATE EXTENSION" and "NC State Extension Publications". Below the navigation bar, there are search and login options. The main content area features a section titled "Adapted to Climate" with a sub-section "Seasons". The "Seasons" section contains text about optimal growing seasons (spring, summer, and fall) and mentions "Figure 1" and "Figure 2". Below the text are two images: Figure 1 shows cool-season vegetables in a garden bed, and Figure 2 shows warm-season vegetables in a raised garden bed. A sidebar on the right lists "RELATED PUBLICATIONS" such as "Asparagus Crown Production" and "Cucurbit Downy Mildew".



Table 1. Garden planting calendar for vegetables, fruits, and herbs in Central North Carolina.

Fruit, Herb, or Vegetable	Days to Harvest (from seed unless otherwise noted)	Distance Between Plants (inches)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			1 15	1 15	1 15	1 15	1 15	1 15	1 15	1 15	1 15	1 15	1 15	1 15
Artichokes, globe	T = 1 year	30			T	T	T							
Artichokes, Jerusalem*	Tu = 6–8 months	9–12			Tu	Tu	Tu							
Arugula	40–50	6–9		S	S	S	S			S	S	S	S	
Asparagus	C = 2 years	18		C	C	C								
Basil	T = 14–35 S = 50–75	2–8					S,T,S,T,S,T,S,T,S,T							
Beans, lima/bush	65–80	6				S	S	S	S	S	S			
Beans, lima/pole	75–95	6				S	S	S	S					
Beans, snap/bush	50–55	2			S	S	S	S	S	S	S	S	S	
Beans, snap/pole	65–70	6			S	S	S	S	S	S	S	S	S	
Beets	55–60	2			S	S	S		S	S	S	S		
Broccoli	T = 70–80	18		T	T	T	T			T	T	T		
Brussels sprouts	T = 40–50 S = 90–100**	14–18							T	T	T	T		
Cabbage	T = 63–75 S = 90–120**	12		T	T	T	T			T	T	T	T	
Cabbage, Chinese	T = 45–55 S = 75–85	12			S,T					S	S	T	T	

Planting Seeds

Plant in well prepared, moist soil.

- Water 4-6 in., allow surface to drain
- Water required for germination
- Damping-off diseases

Plant according to recommendations

- Depth = 1-2x diameter, deeper in fall
- Space closer, then thin seedlings

Seed directly in the garden, or in containers for later transplanting

- Cover and firm (not pack) soil



Thinning Seedlings



When in doubt...

DECAPITATE!

Thin to recommended spacing by snipping with scissors

Seedlings/Starts/Transplants

- Small/young plants
- Easy – higher rate of success
- Good when only need a few plants
- Grow your own transplants – sow seed 4-6 weeks early



Charlotte Glen
NCSU Chatham

Planting Transplants

- 1) Moisten container
- 2) Remove from pot carefully, preserving roots
- 3) Dig a hole same depth as container
- 4) Row covers or other protection from wind, sun (summer)



UIUC Extension

Want more information on seed starting?

go.ncsu.edu/veggieseedresources



How Vegetables are Typically Planted

Seed Sown Direct

Warm Season

- Beans and Field Peas
- Peanuts
- Sweet Corn
- Radish
- Rutabaga
- Turnips, Mustard
- Carrots
- Beets
- Garden Peas
- Potatoes (seed potatoes)

Cool Season

As Transplants

- Tomatoes
- Peppers
- Eggplants
- Sweet Potatoes
- Okra
- Basil
- Broccoli, Cauliflower
- Cabbage, Collards
- Kale
- Garlic – cloves

Both ways: Lettuce , spinach, parsley, dill, cilantro,
onions cucumber, squash , zucchini, melons

Why garden in containers?



Grow Food in Small Spaces



Flexibility & Accessibility



Avoid Soil Problems

Other Considerations

- More frequent watering
- More frequent fertilization
- Don't use native soil



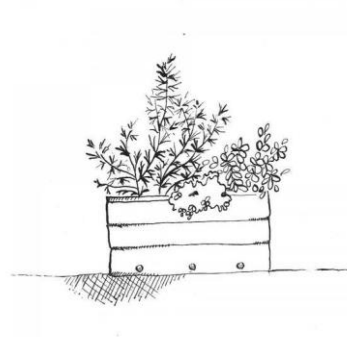
Choosing Containers



Containers can be made of many different materials

Containers must be able to:

- 1) Hold soil media
- 2) Drain water



*Use state nitrogen
in place of nutrients*

Potting Media (“Soil”)

- Don't use soil from the garden
- Poor drainage kills roots
 - Lack of O₂
 - Pathogens
- Instead, use soilless substrates a.k.a. potting mixes



Tiny, flat particles compact and hold moisture

Healthy

Nope!

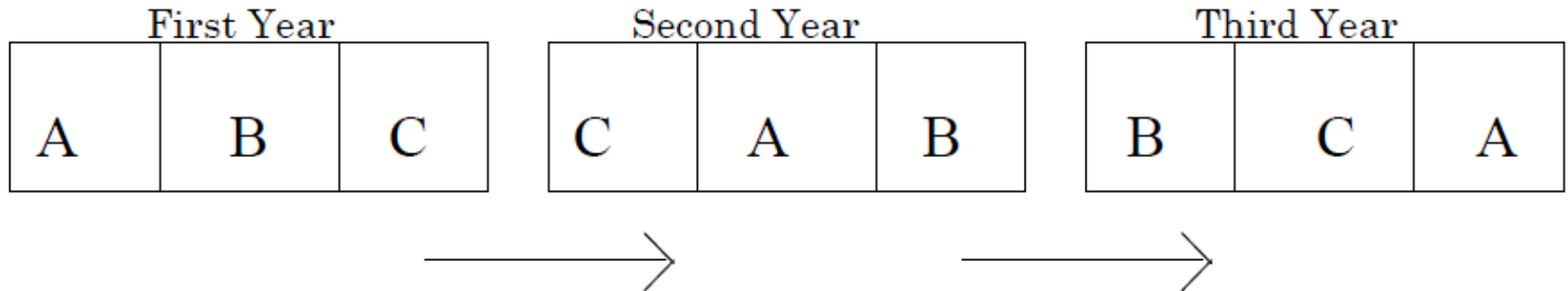
Want more information on container gardening?

<https://go.ncsu.edu/containergardening>



Crop Rotation

- Avoid planting crops in the same family in the same location year after year
- **Minimum 3-year** rotation ideal
- Include **cover crops** in rotation
- Requires **planning and record keeping!**



Plant Families

Brassicaceae (Mustard Family)

- Broccoli, Brussels Sprouts, Cauliflower, Cabbage, Collards, Kale, Mustard, Radish, Turnips, Rutabaga, Kohlrabi

Cucurbitaceae (Squash Family)

- Cucumbers, Squash, Zucchini, Winter Squash, Pumpkins, Cantaloupe, Watermelons

Solanaceae (Nightshade Family)

- Tomatoes, Peppers, Eggplant, Potatoes

Fabaceae (Bean Family)

- Garden peas, peanuts, green beans, lima beans, southern peas

Plant Families

Amarylidaceae (Onion Family)

- Onions, garlic, leeks, scallions

Apiaceae (Carrot Family)

- Carrots, parsnips, dill, fennel, parsley, cilantro

Amaranthaceae (Amaranth Family)

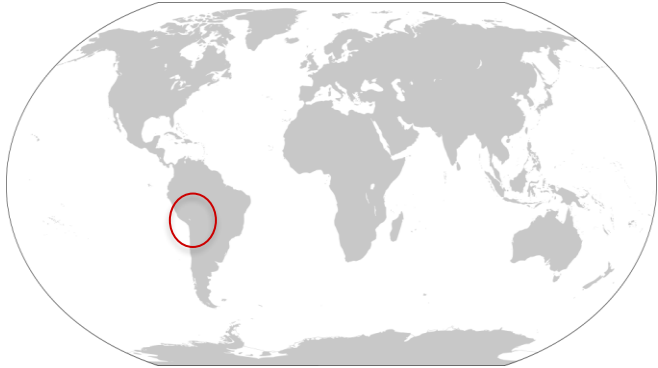
- Spinach, Swiss Chard and Beets

Vegetables with no close relatives:

- Lettuce, endive (Asteraceae)
- Sweet Corn (Poaceae – includes grains like wheat, rice, barley, etc.)
- Sweet Potato (Convolvulaceae)
- Okra (Malvaceae – includes cotton, hibiscus, cacao)

Irish (Andean) Potatoes

Solanum tuberosum (Solanaceae)



Relatives:

Tomatoes, peppers, eggplants

What you eat:

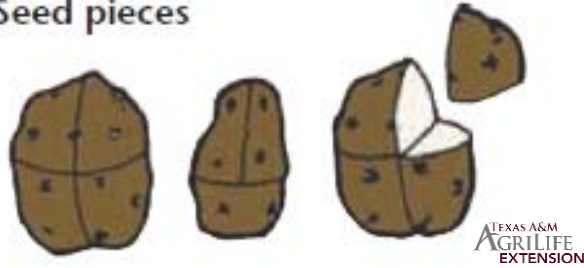
Underground storage stem (tuber)



Planting Potatoes

Plant Seed Potatoes

Seed pieces



In ground or raised bed

- Plant 6" deep, 10-12" x 3' spacing
- Cut side down, 1-3 'eyes' (stem nodes) each
- Mid Feb. to late March

Alternative Methods

- Plant 1" deep, cover in straw or pine needles
- In containers, leave 6-8" gap with top of container

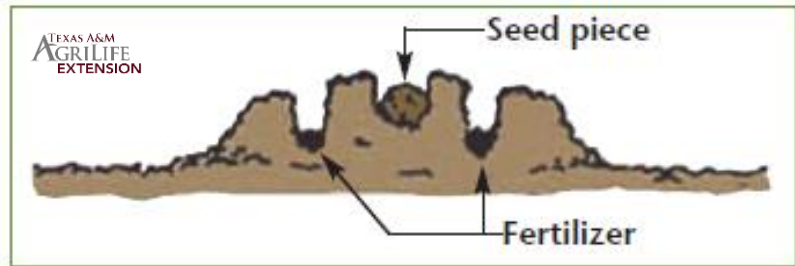
Growing Taters

Fertilizer

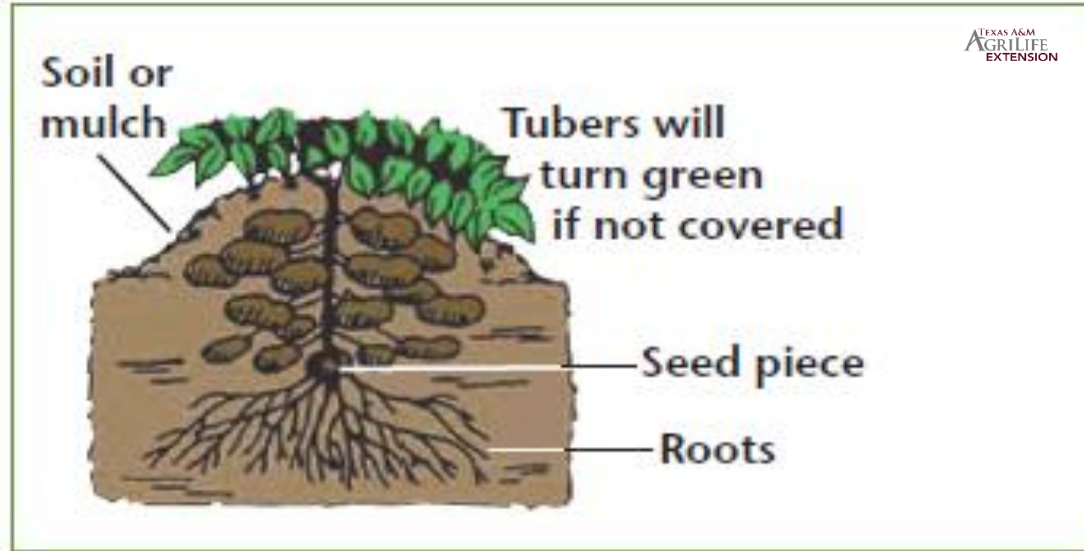
- Soil Test
 - If unavailable, 1 Tbsp 10-20-10 per 10 ft. of row
 - pH 5.8-6.5
- **Side Dressing**
 - 0.05 lbs. actual N /10 ft. of row 4-6 weeks after transplant (tuber formation)
 - = 1 cup blood meal
 - = 5 Tbs NH_4NO_3 (33-0-0)

Watering

- Critical tuber development
- Tubers start to develop with flowers



Growing Taters



- Start hilling when stems are 12” tall
- Cover any tubers that start to surface (prevent toxic greening)

Harvesting Taters

Harvest

- 6-8 weeks (June)
- When tops start to die back
- Use a garden fork
- Easier with straw method
- Harvest some new potatoes by hand

Storage

- Do not rinse off dirt!
- 45-50°F 6-8 months 90% RH (dark)
- Late harvested store better



Tater Cultivars

- ‘Kennebec’
- ‘Yukon Gold’
- ‘Red Pontiac’
- ‘French Fingerling’
- ‘Russian Banana’
- ‘Purple Majesty’



Colorado Potato Beetle

(Chrysomelidae: *Leptinotarsa decemlineata*)



Adults



Eggs



Larva

Colorado Potato Beetle

(Chrysomelidae: *Leptinotarsa decemlineata*)

Hosts

- Potatoes, Eggplant, Tomato, *Solanum* spp.

Signs & Symptoms

- Chewing damage on leaves
- Defoliation
- Larvae and adults

Management

- Handpicking
- Spinosad
- Azadirachtin
- Bt *tenebrionis*



Asparagus

Asparagus officinalis (Asparagaceae)



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Martin LeBar
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Herbaceous Perennial:
Live 10-15 years



chidorian
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Dioecious:
Separate male & female plants)



Distant Relatives: *Agave*, *Yucca* (Agavoideae)

What you eat: Spears (immature stems)

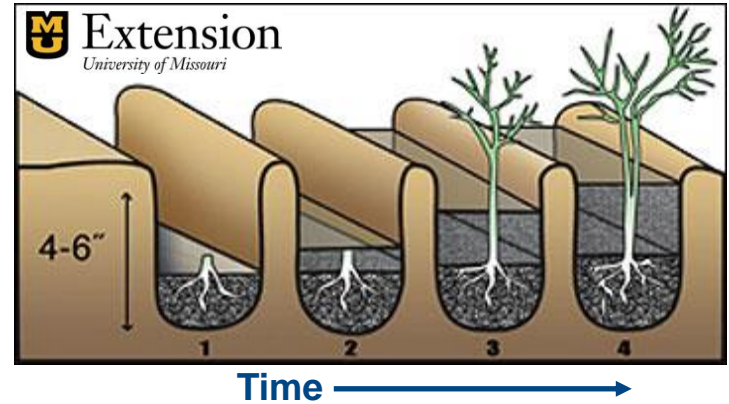
Planting Asparagus

Bed Preparation

- Raised beds ideal for good drainage
- Dig a 12-18" wide trench, 6-8" deep
- 5' between rows

Planting Crowns

- 10-20 crowns per person
- Mid Feb. through late Mar.
- 12-18" apart
- Cover with 2" of soil
- Continue adding soil as plant grows until trench is filled



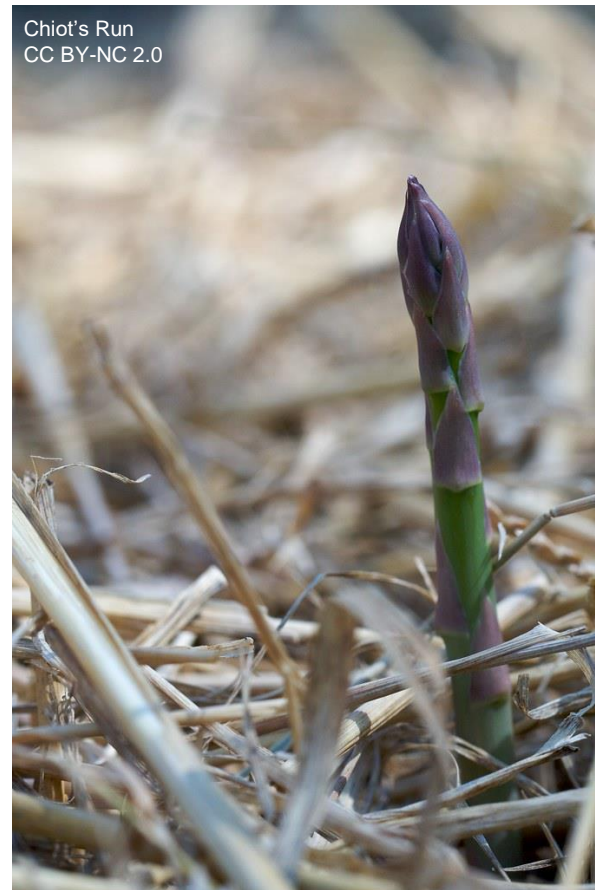
Growing Asparagus

Fertilizer

- Soil Test – sample bed separately
 - pH 6.7-7.0
- 1.7 lbs. N per 1000 ft²
 - **Prior to planting:** bottom of trench, cover in soil
 - **Subsequent years:** along row, early spring before spear emergence
- **Side Dressing**
 - 1.5 lbs. CaNO₃ (15.5-0-0) per 100 ft of row after harvest
 - Top dress with compost

Watering

- 1" per week equivalent
- Moisten to a depth of 6 inches



Growing Asparagus

Cultural Practices

- Weed the bed before spear emergence
- Add 2-3" straw mulch to suppress weeds
- Hand-pull weeds to avoid damaging spears
- After harvest period, allow leaves to grow
- In winter, cut down to 2" stubs after foliage turns brown



Harvesting Asparagus

Harvest

- Spring
- Do not harvest spears the two years after planting!
- Harvest for 4-8 weeks third year and after
 - Stop when emerging spears are pencil width or less
- Spears 6-8” tall or smaller
- Cut or snap at ground level
- Harvest less from less vigorous stands

Storage

- Refrigerator for about a week
- Freeze or can (pressure canner only)



Asparagus Beetles



- Larvae and adults feed on spears and leaves
- Hand-pick
- Neem or Spinosad (organic)

Asparagus Cultivars

Male cultivars = higher yields

- 'Jersey King'
- 'Jersey Knight'
- 'Jersey Gem'
- 'Jersey Giant'
- 'Jersey Supreme'
- 'Purple Passion'

Female Cultivars

- 'Martha Washington'
- 'Mary Washington'
- 'Waltham Washington'

Phytophthora Spear and Crown Rot

- Bent, wilting spears
- With or without conspicuous water-soaked lesions on spears
- Crowns and roots may be yellowed, water-soaked lesions
- Favored by warm and wet conditions



Similar Problems

- **Fusarium** crown, root, & stem rot
- Ubiquitous and long lived in soil
- Favored in drought conditions
 - Low pH
 - Other diseases
- Insect and mechanical damage can also cause bent spears



Dead, chlorotic 'ferns'



Russet-colored spores on stems

Management of Phytophthora Spear Rot

- Avoid planting in wet, heavy soils
- Avoid known contaminated areas
- No fungicides or resistant varieties
- ‘Jersey’ varieties resistant to *Fusarium*, but not *Phytophthora*
- Replant in new area

